-*MESOTRICHOSIPHUM* CALILUNG (HEMIPTERA: APHIDIDAE: GREENIDEINAE), A NEWLY RECORDED GENUS FROM CHINA, WITH THE DESCRIPTION OF A NEW SPECIES[1]

Dong Zhang[2] and Gexia Qiao[3]

ABSTRACT: The genus *Mesotrichosiphum* Calilung, an endemic southeastern Asian group, is reviewed to include *Mesotrichosiphum pentaiarticulatum* Zhang and Qiao, sp. nov. from China (Hainan). The generic diagnosis is supplemented in here, and a key is given to all species worldwide. Some hitherto unknown morphs of *Mesotrichosiphum* are described. New data on distributions and host plants are reported for the genus. The type specimens are deposited in Zoology Museum, Institute of Zoology, Chinese Academy of Sciences.

KEY WORDS: Aphididae, Greenideinae, *Mesotrichosiphum*, China

The aphid genus *Mesotrichosiphum* Calilung, 1967 is a small group in the tribe Greenideini, subfamily Greenideinae, family Aphididae, with only two species (Remaudière and Remaudière, 1997). It is restrictedly distributed in southeastern Asia.

The genus *Mesotrichosiphum* and its type species, *M. uichancoi*, was originally described by Calilung (1967a) based on apterous and alate viviparous females from the Philippines. She noted this genus differs from its affiliated genus *Eutrichosiphum* Essig and Kuwana in having 4-segmented antennae in the apterae and sparse, mostly short body hairs. Blackman and Eastop (1994) included just the type species in the genus *Mesotrichosiphum* on the world's trees. Noordam (1994) described the second species, *M. brevisetosum*, which is from Java, only known as one apterous viviparous female, and also illustrated its important characters.

During a survey by the first author in the Diaoluoshan Nature Reserve Regions, Hainan Province, China, a *Mesotrichosiphum*-like species was collected in the tropical rain forest. After having checked extensively, including re-examining the type species of *Mesotrichosiphum*, we think that *Mesotrichosiphum* is firstly recorded in China and one new species is found. Thereby, the paper will review the genus *Mesotrichosiphum*, redefine its diagnosis, describe one new species, and provide a key to the known species. New data on localities are reported. Some hitherto unknown morphs, such as first stage larvae and embryo, of the genus were described in detail.

METHODS

The corresponding author checked type specimens of type species, *Mesotrichosiphum uichancoi* Calilung, in the Natural History Museum, London, UK. All specimens studied are deposited in the Zoological Museum, Institute of Zoology, Chinese Academy of Sciences, Beijing (ZMCAS), and in the Natural History Museum, London (BMNH).

Aphid terminology follows Noordam (1994) and Qiao (2000). Measurements are in millimeters (mm). The taxonomic system of Remaudière and Remaudière (1997) was followed here.

[1] Received on April 23, 2007. Accepted on September 14, 2007.

[2] Institute of Zoology, Chinese Academy of Sciences, Datun Road, Chaoyang, Beijing 100101, P.R. China; Graduate University of Chinese Academy of Sciences, Beijing 100049. E-mail: ernest8445@ 163.com.

[3] Institute of Zoology, Chinese Academy of Sciences, Datun Road, Chaoyang, Beijing 100101, P.R. China. Corresponding Author. E-mail: qiaogx@ioz.ac.cn.

Mailed on June 23, 2008

In Table 1, the following abbreviations have been used: Ant.I, Ant.II, Ant.III, Ant.IV, Ant.V, Ant.Vb, for antennal segments I, II, III, IV, V and the base of antennal segment V, respectively; Ant.IIIWD, widest diameter of antennal segment III; PT, processus terminalis; URS, ultimate rostral segment; BW URS, basal width of ultimate rostral segment; MW hind tibia, mid-width of hind tibia; 2HT, hind second tarsal segment; SIPH, siphunculus; BW SIPH, DW SIPH, basal width and distal width of siphunculi; STDEV, standard deviation; BW Cauda, basal width of cauda; Tergum I and Tergum VIII, abdominal tergites I and VIII.

Mesotrichosiphum Calilung, 1967 NEW RECORD FOR CHINA

Mesotrichosiphum Calilung, 1967a: 89; type specie: *Mesotrichosiphum uichancoi* Calilung, 1967, by original designation.

Mesotrichosiphum Calilung: Calilung, 1967b: 117; Noordam, 1994: 120; Blackman and Eastop, 1994: 744; Remaudière and Remaudière, 1997: 176.

Diagnosis. Body pear-shaped. Eyes with multi-facets and ocular tubercle. Median front slightly convex. Antennae 4- or 5-segmented (occasionally 6-segmented), with sparse and mostly short hairs, which are blunt and acute; processus terminalis bare over its length, about 0.53-0.87 times as long as base of the antennal terminal segment. Dorsal hairs on thorax sparse and tiny, about 0.006-0.020 long. Legs short, with short and sturdy hairs, tibial hairs about 0.007-0.06 long. Hind tibia 0.73-1.23 times as long as the width of the head across eyes. First tarsal chaetotaxy: 5, 5, 5. Dorsal hairs of abdomen same as in thorax. Siphunculi with a convex inner side and a slightly convex outer side, enlarged in median part, covered with over 20 stout and long hairs, spinulose or formed a reticulation at apex. In alatae, median vein of the forewing twice branched, hind wing with one oblique vein.

Host Plants. Fagaceae and Verbenaceae.

Distribution. China, Philippines, and Indonesia.

KEY TO SPECIES OF GENUS *MESOTRICHOSIPHUM* (BASED ON APTEROUS VIVIPAROUS FEMALE)

1. Antennae 5-segmented (occasionally 6-segmented), processus terminalis 0.71-0.87 times as long as base of the segment V; hind tibia 1.10-1.23 times as long as the width of head across eyes. On *Castanopsis hainanensis* ....*M. pentaiarticulatum* Zhang and Qiao, NEW SPECIES
- Antennae 4-segmented, processus terminalis about 1/2 of base of the segment IV; hind tibia at most 0.80 times as long as the width of head across eyes 2
2. Siphunculi reticulated at apex. On *Premna odorata* .....*M. uichancoi* Calilung
- Siphunculi not reticulated at apex, entirely spinulose. On *Lithocarpus bennettii*..... .....*M. brevisetosum* Noordam

Mesotrichosiphum uichancoi Calilung, 1967

Mesotrichosiphum Calilung, 1967a: 89.

Mesotrichosiphum Calilung: Calilung, 1967b: 117; Blackman and Eastop, 1994: 744; Remaudière and Remaudière, 1997: 176.

Specimens Examined. Paratypes: 2 apterous viviparous females, THE PHILIPPINES, Banus, Laguna, alt. 50m, 5 Sep. 1949, leg. L. B. Uichanco, on Premna odorata (BMNH).

Distribution. Philippines.

Mesotrichosiphum brevisetosum Noordam, 1994

Mesotrichosiphum Noordam, 1994: 121.

Mesotrichosiphum Noordam: Remaudière and Remaudière, 1997: 176.

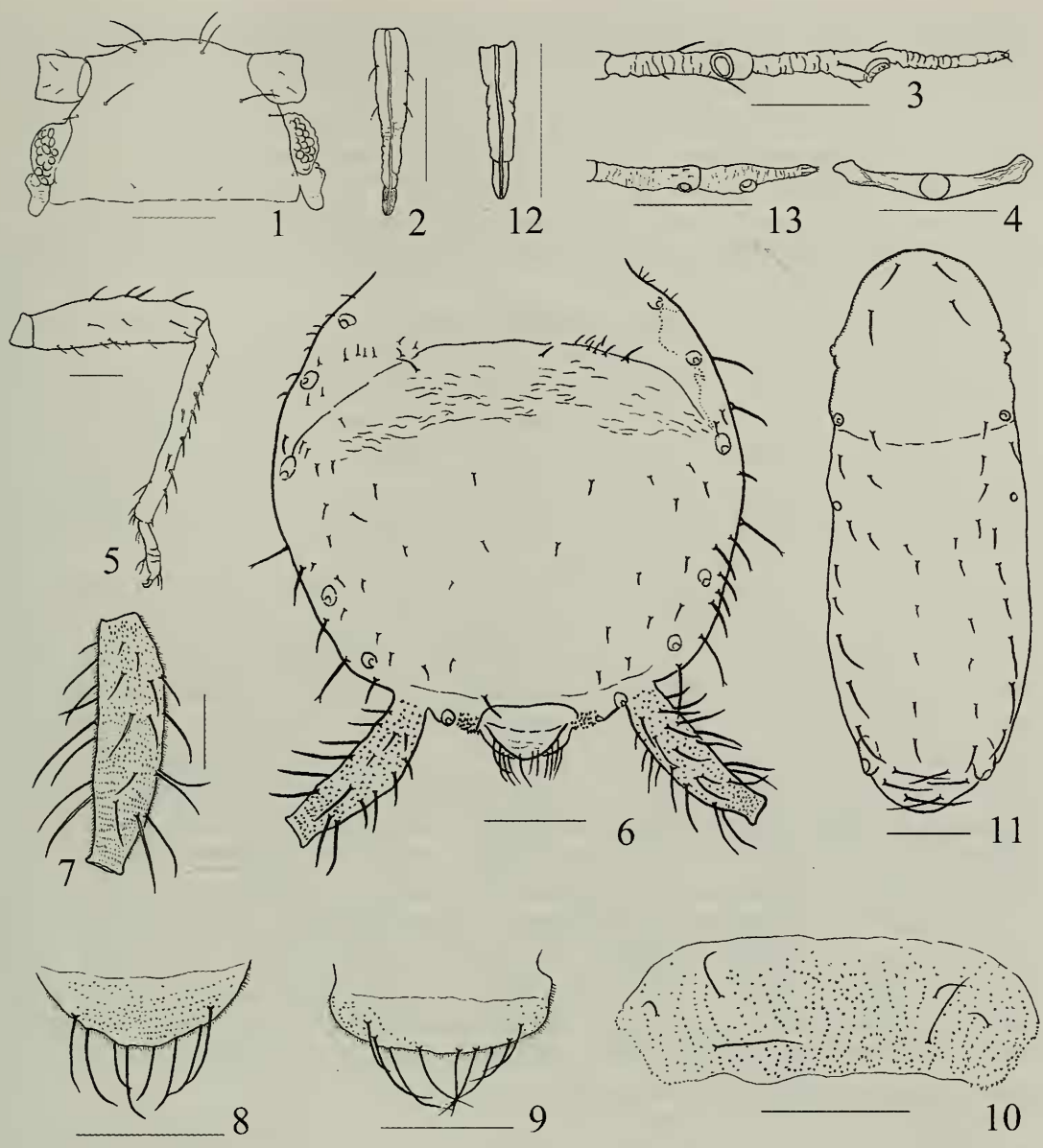
Specimens Examined. None.
Remarks. All the information about this species is from Noordam (1994).
Distribution. Indonesia (Java).

Mesotrichosiphum pentaiarticulatum Zhang and Qiao, NEW SPECIES
(Figures 1-13)

Etymology. The new species is named after its 5-segmented antenna.

Description. Apterous viviparous female. Head and thorax black or blackish green, abdomen brown, siphunculi black in life. General measurements see Table 1. Mounted specimens: Body pear-shaped. Head: Antennal segment IV, base of segment V and ocular tubercles dark brown, other parts brownish. Head fused with prothorax. Only distal half of antennal segments III to V with transverse imbrications, other parts smooth. Median front slightly convex, antennal tubercles indistinct (Fig. 1). Dorsal hairs sparse and elongate, with acuminate apex; ventral hairs fine, long and pointed. Head with 1 pair of frontal hairs, 1 pair of dorsal hairs between antennae, and 3-5 pairs of dorsal hairs between eyes, among which 1 pair of distinct long. Eyes multi-faceted, with ocular tubercles. Antennae 5-segmented or occasionally 6-segmented (Fig. 3); length in proportion of antennal segments I-V: 23: 16: 100: 39: 45+35, respectively. Antennal hairs sparse and most short, pointed at apex, segments I-V each with 4 or 5, 3-5, 11-16, 3 or 4, 2-4+0 hairs, respectively, apex of processus terminalis with 3 hairs. Rostrum reaching the posterior margin of abdominal segment II; ultimate rostral segment long wedge-shaped (Fig. 2), with 3 pairs of primary hairs and 2 pairs of secondary hairs. Thorax: Dorsum of thorax brownish. The lateral and ventral surfaces with transverse wrinkles. Dorsal hairs of thorax sparse and tiny. Pronotum with 4 hairs; mesonotum with 12-16 hairs; metanotum with 8 hairs. Mesosternal furca blackish brown, sclerotized distinctly, with a short stem (Fig. 4), length of single arm 0.09-0.11, 2.50-3.67 times as long as widest diameter of antennal segment III. Legs with sturdy hairs (Fig. 5). Trochanter separated from femur. Coxae, trochanters and femora brown, tibiae and tarsi brownish. Base of each coxae coarsely spinulose. First tarsal chaetotaxy: 5, 5, 5. Abdomen: Brown, except the lateral parts of tergites I-III pale brown. Abdominal tergites I-III each with 1 pair of brown marginal patches, each of which bears 1 or 2 stout and ramifying dorsal hairs. Dorsal patches on the median part of tergites II to VII fused to each other, forming a large round sclerotized patch, which has transverse wrinkles dorsally. Tergite VIII brown, heavily sclerotized, and coarsely spinulose. Most dorsal hairs of abdomen sparse and tiny, only marginal hairs thick, long and ramifying; ventral hairs fine and pointed; dorsal hairs 2.00-3.00 times as long as ventral hairs. Abdominal tergites I-VI each with 10-24 hairs, respectively, somewhat irregularly arranged in 1-3 transverse rows; tergites VII and VIII each with 1 pair of spinal hairs (Fig. 6). Length of marginal hairs on abdominal tergite I 1.00-1.50 times as long as widest diameter of antennal segment III. Spiracles on prothorax and abdominal segments I-VII large, round and open. Siphunculi evenly brown, darker than the body, with a convex inner side and a slightly convex outer side (Fig. 7), enlarged in median part, gradually tapering to the apex, flange distinct, without a net work, entirely covered with spinulose imbrications and separate spinulae; 3.50-4.30 times as long as its widest part, 5.29-6.14 times as long as its distal width; with 32-46 long and thick hairs. Cauda and anal plate spinulose. Cauda semi-round (Fig. 8), 0.29-0.38 times as long as its basal width, with 8 thick long hairs and ventral network, without median processus. Anal plate transversely sub-elliptical (Fig. 9), with 10-14 thick long hairs. Genital plate transverse sub-oval (Fig. 10), with 6-8 hairs. Gonapophyses three, each with 3-5 short and pointed hairs.

First-instar viviparous nymph. General measurements see Table 1. Body long oval. Head pale brown, with 1 pair of frontal hairs, 1 pair of dorsal hairs between antennae, and



Figures 1-13. *Mesotrichosiphum pentaiarticulata* Zhang and Qiao, sp. nov. Figures 1-10, apterous viviparous female. 1. dorsal view of head; 2. ultimate rostral segment; 3. antennal segments IV-V; 4. mesosternal furca; 5. right hind tibia; 6. dorsal view of abdomen; 7. siphunculus; 8. cauda; 9. anal plate; 10. genital plate. Figures 11-13, embryo. 11. dorsal view of body; 12. ultimate rostral segment; 13. antennal segments III-IV. Scale bars in figs 1-5 and 7-13: 0.10 mm; in fig 6: 0.20 mm.

1 pair of dorsal hairs between eyes. Eyes brown, with 3 facets. Antennae 4-segmented; length in proportion of antennal segments I-IV: 45: 33: 100: 58+48, respectively; antennal segments I-IV each with 3, 3, 2, 2+0 hairs, respectively, apex of processus terminalis with 3 or 4 hairs. Rostrum reaching the posterior margin of abdominal segment VI. Thoracic hairs sparse and tiny, pronotum with 1 pair of spinal and 1 pair of marginal hairs; mesonotum and metanotum each with 1 pair of spinal, 1 pair of pleural and 1 pair of marginal hairs. Legs entirely brown. First tarsal chaetotaxy: 2, 2, 2. Abdominal tergites I-VI each with 1 pair of spinal, 2 or 3 pairs of pleural and 1 pair of marginal sclerotized patches, the spinal ones occasionally fused with each other. Tergites I-VI each with 1 pair of thick and

ramifying marginal hairs and 4 dorsal hairs, each on a brown sclerite; tergite VII with 1 pair of marginal tubercles, protruding backwards, nipple-shaped, 0.05 mm long, 0.02-0.03 mm wide, each provided at apex with 1 long and thick hair, 0.09-0.10 mm, 1 pair of spinal hairs, 0.06-0.07 mm, on the posterior margin of the smooth sclerite; tergite VIII brown and heavily sclerotized, with spinulose imbrications and 1 pair of nipple-shaped tubercles which occupy the most part of the tergite and protrude backwards, each with 1 hair at apex. Siphunculi brown on abdominal segment VI, bare, cone-shaped with rounded apex. Cauda with 2 thick long hairs. Anal plate with 4 thick long hairs.

Embryo (in apterous viviparous female). Body long oval and entirely colorless (Fig. 11). Measurements: Body 0.75 mm long, 0.28 mm wide. Antenna 0.27 mm long, segments I-IV: 0.052, 0.039, 0.082, 0.052+0.045 mm long, respectively. Ultimate rostral segment 0.12 mm long (Fig. 12). Second hind tarsal segment 0.072 mm long. Head fused with prothorax. Eyes with 3 facets. Antennae 4-segmented, 0.36 times as long as body; segments III and IV with transverse imbrications (Fig. 13); length in proportion of segments I-IV: 63: 48: 100: 63+55, respectively; processus terminalis 0.87 times as long as base of the segment IV; segments I-IV each with 0, 2, 3, 0+0 stout and long hairs, respectively, apex of processus terminalis with 2 hairs; hairs on segment III tiny and fine. Rostrum reaching abdominal segment IV; ultimate rostral segment wedge-shaped, 3.83 times as long as basal width. Dorsal hairs tiny and sparse, only marginal hairs thick and long, pointed or ramifying. Head with 1 pair of frontal hairs and 1 pair of dorsal hairs between eyes. Pronotum with 1 pair of short pleural hairs; mesonotum with 1 pair of pleural and 1 pair of marginal hairs; metanotum with1 pair of pleural hairs. Abdominal tergite I with 1 pair of spinal, 1 pair of pleural and 1 pair of marginal hairs; tergites II-VI each with 1 pair of spinal and 1 pair of marginal hairs; tergite VII with 1 pair of spinal and 1 pair of pleural hairs; tergites VIII with 1 pair of spinal hairs. First tarsal chaetotaxy: 2, 2, 2. Siphunculi present.

Type Data. Holotype, apterous viviparous female, CHINA, Hainan, Diaoluoshan Reserve Region (N18°40', E109°54'), alt. 265 m, 27 Mar. 2006, on Fagaceae, leg. D. Zhang (ZMCAS, No. 18489). Paratypes, 5 apterous viviparous females, 3 first-instar viviparous nymphs, 1 embryo, from the same collection of holotype; 3 apterous viviparous females, alt. 300 m, 30 Mar. 2006, on *Castanopsis hainanensis*, other data same as holotype (ZMCAS, No. 18519).

Biology. This species infests on the young leaves of *Castanopsis hainanensis* (Fagaceae).

Remarks. Based on dense and long hairs on siphunculi and absence of any finger-like processi, this species is placed in the tribe Greenideini, subfamily Greenideinae. This species can be easily differed from the species of *Greenidea* Schouteden and *Mollitrichosiphum* Suenaga in having cauda without a median processus and hind tibiae without transverse ridge. In addition, the species in *Allotrichosiphum* Takahashi and *Tritrichosiphum* Robinson have seven or three hairs on the tarsal segment I, while this species has five. A similar arrangement of the tarsal chaetotaxy can also be observed in the genera *Eutrichosiphum* Essig and Kuwana and *Greenideoida* van der Goot, but in this species body hairs sparse and tiny; processus terminalis distinctly shorter than base of antennal terminal segment. Based on the above materials, and the keys of Ghosh (1993) and Noordam (1994), the new species should be placed in the genus *Mesotrichosiphum* Calilung. This species can be easily separated from other congeneric species in apterous viviparous females by antennae 5-segmented (occasionally 6-segmented), processus terminalis 0.71-0.87 times as long as base of the segment V; hind tibia 1.10-1.23 times as long as the width of head across eyes; siphunculi entirely covered with spinulose imbrications and separate spinulae.

Table 1. Biometric data (mean, range and standard deviation) of *Mesotrichosiphum pentaiarticulata* Zhang and Qiao, sp. nov. (apterous vivipara female and first-instar apterous nymph).

Body part (see Methods for abbreviations)	Apterous vivipara females $n = 9$			First-instar apterous nymphs $n = 3$		
	Mean	Range	Stdev	Mean	Range	Stdev
Body length	1.530	1.40-1.68	0.103	0.841	0.82-0.87	0.021
Body width	0.925	0.88-1.05	0.057	0.326	0.30-0.34	0.024
Head width	0.380	0.35-0.44	0.029	0.264	0.25-0.28	0.016
Antenna	0.856	0.77-1.02	0.077	0.323	0.29-0.35	0.031
Ant.I	0.074	0.07-0.08	0.005	0.052	0.05	0
Ant.II	0.052	0.05	0	0.038	0.03-0.04	0.006
Ant.III	0.312	0.29-0.35	0.026	0.113	0.10-0.12	0.010
Ant.IV (Ant.IVb in first-instar nymph)	0.122	0.11-0.13	0.009	0.065	0.06-0.07	0.006
Ant.Vb (PT in first-instar nymph)	0.144	0.13-0.15	0.007	0.055	0.04-0.06	0.012
PT	0.122	0.10-0.13	0.012	—	—	—
Length of hairs on Ant.III	0.026	0.02-0.04	0.007	0.014	0.01-0.02	0.003
Ant.IIIWD	0.032	0.03-0.04	0.003	0.022	0.020-0.023	0.001
URS	0.199	0.19-0.22	0.015	0.141	0.13-0.14	0.006
BW URS	0.031	0.03	0	0.031	0.03	0
Hind femur	0.371	0.34-0.43	0.030	0.155	0.15	0
Hind tibia	0.443	0.39-0.48	0.047	0.192	0.18-0.21	0.012
MW hind tibia	0.046	0.04--0.05	0.004	0.039	0.036-0.041	0.003
2HT	0.108	0.10-0.11	0.005	0.079	0.07-0.08	0.006
Length of hairs on hind tibia	0.051	0.04-0.06	0.005	0.043	0.041-0.046	0.003
SIPH	0.386	0.34-0.44	0.035	0.096	0.07-0.11	0.021
BW SIPH	0.067	0.06-0.07	0.006	0.048	0.04-0.05	0.006
DW SIPH	0.068	0.06-0.07	0.005	?	?	?
Cauda	0.054	0.05-0.06	0.005	0.029	0.026-0.031	0.003
BW cauda	0.165	0.15-0.18	0.007	0.079	0.07-0.09	0.012
Length of cephalic hairs	0.053	0.04-0.06	0.006	0.041	0.04	0
Length of marginal hairs on tergum I	0.037	0.03-0.05	0.006	0.021	0.02	0
Dorsal hairs on tergum VIII	0.048	0.04-0.06	0.008	0.081	0.077-0.082	0.003

Length (mm)

Ratios	Antenna/Body	0.560	0.50-0.61	0.037	0.384	0.33-0.42	0.045
	Hind femur/Ant.III	1.200	1.03-1.54	0.169	1.371	1.25-1.50	0.125
	Hind tibia/Body	0.290	0.25-0.33	0.029	0.229	0.21-0.25	0.017
	PT/Ant.Vb (PT/Ant.IVb In first-instar nymph)	0.802	0.71-0.87	0.052	0.841	0.67-0.86	0.167
	URS/BW URS	6.444	5.67-7.00	0.471	4.556	4.33-4.67	0.192
	URS/2HT	1.852	1.70-2.00	0.109	1.792	1.63-2.00	0.191
	SIPH/Body	0.251	0.23-0.27	0.020	0.114	0.09-0.14	0.020
	SIPH/Cauda	7.208	6.17-8.60	1.04	3.268	2.81-3.67	0.434
	SIPH/BW SIPH	5.786	4.71-6.33	0.500	1.983	1.75-2.20	0.225
	Cauda/BW Cauda	0.327	0.29-0.38	0.031	0.373	0.33-0.43	0.050
	Length of hairs on Ant.III/Ant.IIIWD	0.826	0.67-1.33	0.236	0.618	0.50-0.68	0.102
	Cephalic hairs/ Ant. IIIWD	1.657	1.25-2.00	0.252	1.882	1.82-2.00	0.102
	Marginal hairs on Tergum I/ Ant.IIIWD	1.166	1.00-1.50	0.204	0.941	0.91-1.00	0.051
	Dorsal hairs on Tergum VIII/ Ant. IIIWD	1.500	1.00-2.00	0309	3.681	3.65-3.75	0.061
	Hairs on hind tibia/ MW hind tibia	1.102	1.00-1.34	0.121	1.089	1.00-1.14	0.078
	Head width/SIPH	0.979	0.90-1.09	.0.059	2.856	2.40-3.71	0.744
	Head width/Cauda	7.119	5.67-8.60	0.898	9.140	8.00-10.42	1.216
	PT/SIPH	0.297	0.26-0.31	0.015	0.601	0.40-0.86	0.234

ACKNOWLEDGEMENTS

Thanks are due to Drs. R. L. Blackman and V. F. Eastop for having invited the corresponding author to BMNH on a study visit. Mr. M. Webb is thanked for providing assistance to the corresponding author during his visit to the BMNH. Ms. Caiping Liu prepared the slides. This work was sponsored by the National Natural Sciences Foundation of China (Grant No. 30570214, No. 30670240), CAS innovation program (No. KSCX2-YW-Z-011), the Ministry of Science and Technology of the People's Republic of China (MOST grant no. 2006FY110500), the National Science Fund for Fostering Talents in Basic Research (Special subjects in animal taxonomy, NSFC-J0630964/J0109), and Key Project of Science-technology Basic Condition Platform from The Ministry of Science and Technology of the People's Republic of China (No. 2005DK A21402).

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